INTERNATIONAL JOURNAL OF INNOVATIVE TECHNOLOGYAND CREATIVE ENGINEERING

ISSN(Online): 2045-8711
ISSN(Print): 2045-869X

MAY 2025

VOL. 15 ISSUE NO.05

www.ijitce.co.uk

UK: Managing Editor
International Journal of Innovative Technology and Creative Engineering
1a park lane,
Cranford
London
TW59WA
UK

USA: Editor
International Journal of Innovative Technology and Creative Engineering
Dr. Arumugam
Department of Chemistry
University of Georgia
GA-30602, USA.

India: Editor
International Journal of Innovative Technology & Creative Engineering
36/4 12th Avenue,1st cross St,Vaigai Colony,Ashok Nagar, Chennai, India 600083

Email: editor@ijitce.co.uk

IJITCE PUBLICATION

International Journal of Innovative Technology & Creative Engineering

Vol.15 No.05

MAY 2025

IJITCE PUBLICATION

Dear Researcher,

Greetings

Articles In this issue discusses about

1. **GRAHAS VR STEP Approach: A User-Centric Framework for Developing Immersive Training Experience**
2. **Corporate investigation Automation using AI, ML & LLM**

We look forward many more new technologies in the next month.

Thanks,
Editorial Team
IJITCE

Editorial Members

Dr. Chee Kyun Ng Ph.D
Department of Computer and Communication Systems,
Faculty of Engineering,Universiti Putra Malaysia,UPMSerdang, 43400 Selangor,Malaysia.

Dr. Simon SEE Ph.D
Chief Technologist and Technical Director at Oracle Corporation, Associate Professor (Adjunct) at Nanyang Technological University
Professor (Adjunct) at ShangaiJiaotong University, 27 West Coast Rise #08-12,Singapore 127470

Dr. sc.agr. Horst Juergen SCHWARTZ Ph.D,
Humboldt-University of Berlin,Faculty of Agriculture and Horticulture,Asternplatz 2a, D-12203 Berlin,Germany

Dr. Marco L. BianchiniPh.D
Italian National Research Council; IBAF-CNR,Via Salaria km 29.300, 00015 MonterotondoScalo (RM),Italy

Dr. NijadKabbara Ph.D
Marine Research Centre / Remote Sensing Centre/ National Council for Scientific Research,
P. O. Box: 189 Jounieh,Lebanon

Dr. Aaron Solomon Ph.D
Department of Computer Science,
National Chi Nan University,No. 303, University Road,Puli Town, Nantou County 54561,Taiwan

Dr. Arthanariee. A. M M.Sc.,M.Phil.,M.S.,Ph.D
Director - Bharathidasan School of Computer Applications, Ellispettai, Erode, Tamil Nadu,India

Dr. Takaharu KAMEOKA, Ph.D
Professor, Laboratory of Food,
Environmental & Cultural Informatics Division of Sustainable Resource Sciences,
Graduate School of Bioresources,Mie University, 1577 Kurimamachiya-cho, Tsu, Mie, 514-8507, Japan

Dr. M. Sivakumar M.C.A.,ITIL.,PRINCE2.,ISTQB.,OCP.,ICP. Ph.D.
Technology Architect, Healthcare and Insurance Industry, Chicago, USA

Dr. Bulent AcmaPh.D
Anadolu University,
Department of Economics,Unit of Southeastern Anatolia Project(GAP),26470 Eskisehir,TURKEY

Dr. Selvanathan Arumugam Ph.D
Research Scientist, Department of Chemistry, University of Georgia, GA-30602,USA.

Dr. S. Prasath Ph.D
Assistant Professor, School of Computer Science, VET Institute of Arts & Science (Co-Edu) College, Erode, Tamil Nadu, India

Dr. P.Periyasamy, M.C.A.,M.Phil.,Ph.D.
Associate Professor, Department of Computer Science and Applications, SRM Trichy Arts and Science College, SRM Nagar, Trichy - Chennai Highway, Near Samayapuram, Trichy - 621 105,

Mr. V N Prem Anand
Secretary, Cyber Society of India

Review Board Members

Dr. Rajaram Venkataraman
Chief Executive Officer, Vel Tech TBI || Convener, FICCI TN State Technology Panel || Founder, Navya Insights || President, SPIN Chennai

Dr. Paul Koltun
Senior Research ScientistLCA and Industrial Ecology Group,Metallic& Ceramic Materials,CSIRO Process Science & Engineering Private Bag 33, Clayton South MDC 3169,Gate 5 Normanby Rd., Clayton Vic. 3168, Australia

Dr. Zhiming Yang MD., Ph. D.
Department of Radiation Oncology and Molecular Radiation Science,1550 Orleans Street Rm 441, Baltimore MD, 21231,USA

Dr. Jifeng Wang
Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign Urbana, Illinois, 61801, USA

Dr. Giuseppe Baldacchini
ENEA - Frascati Research Center, Via Enrico Fermi 45 - P.O. Box 65,00044 Frascati, Roma, ITALY.

Dr. MutamedTurkiNayefKhatib
Assistant Professor of Telecommunication Engineering,Head of Telecommunication Engineering Department,Palestine Technical University (Kadoorie), TulKarm, PALESTINE.

Dr.P.UmaMaheswari
Prof &Head,Depaartment of CSE/IT, INFO Institute of Engineering,Coimbatore.

Dr. T. Christopher, Ph.D.,
Assistant Professor &Head,Department of Computer Science,Government Arts College(Autonomous),Udumalpet, India.

Dr. T. DEVI Ph.D. Engg. (Warwick, UK),
Head,Department of Computer Applications,Bharathiar University,Coimbatore-641 046, India.

Dr. Renato J. orsato
Professor at FGV-EAESP,Getulio Vargas Foundation,São Paulo Business School,RuaItapeva, 474 (8° andar),01332-000, São Paulo (SP), Brazil Visiting Scholar at INSEAD,INSEAD Social Innovation Centre,Boulevard de Constance,77305 Fontainebleau - France

Y. BenalYurtlu
Assist. Prof. OndokuzMayis University

Dr.Sumeer Gul
Assistant Professor,Department of Library and Information Science,University of Kashmir,India

Dr. ChutimaBoonthum-Denecke, Ph.D
Department of Computer Science,Science& Technology Bldg., Rm 120,Hampton University,Hampton, VA 23688

Dr. Renato J. Orsato
Professor at FGV-EAESP,Getulio Vargas Foundation,São Paulo Business SchoolRuaItapeva, 474 (andar),01332-000, São Paulo (SP), Brazil

Dr. Lucy M. Brown, Ph.D.
Texas State University,601 University Drive,School of Journalism and Mass Communication,OM330B,San Marcos, TX 78666

JavadRobati
Crop Production Departement,University of Maragheh,Golshahr,Maragheh,Iran

VineshSukumar (PhD, MBA)
Product Engineering Segment Manager, Imaging Products, Aptina Imaging Inc.

Dr. Binod Kumar PhD(CS), M.Phil.(CS), MIAENG,MIEEE
Professor, JSPM's Rajarshi Shahu College of Engineering, MCA Dept., Pune, India.

Dr. S. B. Warkad
Associate Professor, Department of Electrical Engineering, Priyadarshini College of Engineering, Nagpur, India

Dr. doc. Ing. RostislavChoteborský, Ph.D.
Katedramateriálu a strojírenskétechnologie Technickáfakulta,Ceskázemedelskáuniverzita v Praze,Kamýcká 129, Praha 6, 165 21
Dr. Paul Koltun
Senior Research ScientistLCA and Industrial Ecology Group,Metallic& Ceramic Materials,CSIRO Process Science & Engineering Private Bag 33, Clayton South MDC 3169,Gate 5 Normanby Rd., Clayton Vic. 3168

DR.ChutimaBoonthum-Denecke, Ph.D
Department of Computer Science,Science& Technology Bldg.,HamptonUniversity,Hampton, VA 23688

Mr. Abhishek Taneja B.sc(Electronics),M.B.E,M.C.A.,M.Phil.,
Assistant Professor in the Department of Computer Science & Applications, at Dronacharya Institute of Management and Technology, Kurukshetra. (India).

Dr. Ing. RostislavChotěborský,ph.d,
Katedramateriálu a strojírenskétechnologie, Technickáfakulta,Českázemědělskáuniverzita v Praze,Kamýcká 129, Praha 6, 165 21

Dr. AmalaVijayaSelvi Rajan, B.sc,Ph.d,
Faculty – Information Technology Dubai Women's College – Higher Colleges of Technology,P.O. Box – 16062, Dubai, UAE
Naik Nitin AshokraoB.sc,M.Sc
Lecturer in YeshwantMahavidyalayaNanded University

Dr.A.Kathirvell, B.E, M.E, Ph.D,MISTE, MIACSIT, MENGG
Professor - Department of Computer Science and Engineering,Tagore Engineering College, Chennai

Dr. H. S. Fadewar B.sc,M.sc,M.Phil.,ph.d,PGDBM,B.Ed.
Associate Professor - Sinhgad Institute of Management & Computer Application, Mumbai-BangloreWesternly Express Way Narhe, Pune - 41

Dr. David Batten
Leader, Algal Pre-Feasibility Study,Transport Technologies and Sustainable Fuels,CSIRO Energy Transformed Flagship Private Bag 1,Aspendale, Vic. 3195,AUSTRALIA

Dr R C Panda
(MTech& PhD(IITM);Ex-Faculty (Curtin Univ Tech, Perth, Australia))Scientist CLRI (CSIR), Adyar, Chennai - 600 020,India

Miss Jing He
PH.D. Candidate of Georgia State University,1450 Willow Lake Dr. NE,Atlanta, GA, 30329

Jeremiah Neubert
Assistant Professor,MechanicalEngineering,University of North Dakota

Hui Shen
Mechanical Engineering Dept,Ohio Northern Univ.

Dr. Xiangfa Wu, Ph.D.
Assistant Professor / Mechanical Engineering,NORTH DAKOTA STATE UNIVERSITY

SeraphinChallyAbou
Professor,Mechanical& Industrial Engineering Depart,MEHS Program, 235 Voss-Kovach Hall,1305 OrdeanCourt,Duluth, Minnesota 55812-3042

Dr. Qiang Cheng, Ph.D.
Assistant Professor,Computer Science Department Southern Illinois University CarbondaleFaner Hall, Room 2140-Mail Code 45111000 Faner Drive, Carbondale, IL 62901

Dr. Carlos Barrios, PhD
Assistant Professor of Architecture,School of Architecture and Planning,The Catholic University of America

Y. BenalYurtlu
Assist. Prof. OndokuzMayis University

Dr. Lucy M. Brown, Ph.D.
Texas State University,601 University Drive,School of Journalism and Mass Communication,OM330B,San Marcos, TX 78666

Dr. Paul Koltun
Senior Research ScientistLCA and Industrial Ecology Group,Metallic& Ceramic Materials CSIRO Process Science & Engineering

Dr.Sumeer Gul
Assistant Professor,Department of Library and Information Science,University of Kashmir,India

Dr. ChutimaBoonthum-Denecke, Ph.D
Department of Computer Science,Science& Technology Bldg., Rm 120,Hampton University,Hampton, VA 23688

Dr. Renato J. Orsato
Professor at FGV-EAESP,Getulio Vargas Foundation,São Paulo Business School,RuaItapeva, 474 (8° andar)01332-000, São Paulo (SP), Brazil

Dr. Wael M. G. Ibrahim
Department Head-Electronics Engineering Technology Dept.School of Engineering Technology ECPI College of Technology 5501 Greenwich Road - Suite 100,Virginia Beach, VA 23462

Dr. Messaoud Jake Bahoura
Associate Professor-Engineering Department and Center for Materials Research Norfolk State University,700 Park avenue,Norfolk, VA 23504

Dr. V. P. Eswaramurthy M.C.A., M.Phil., Ph.D.,
Assistant Professor of Computer Science, Government Arts College(Autonomous), Salem-636 007, India.

Dr. P. Kamakkannan,M.C.A., Ph.D .,
Assistant Professor of Computer Science, Government Arts College(Autonomous), Salem-636 007, India.

Dr. V. Karthikeyani Ph.D.,
Assistant Professor of Computer Science, Government Arts College(Autonomous), Salem-636 008, India.

Dr. K. Thangadurai Ph.D.,
Assistant Professor, Department of Computer Science, Government Arts College (Autonomous), Karur - 639 005,India.

Dr. N. Maheswari Ph.D.,
Assistant Professor, Department of MCA, Faculty of Engineering and Technology, SRM University, Kattangulathur, Kanchipiram Dt - 603 203, India.

Mr. Md. Musfique Anwar B.Sc(Engg.)
Lecturer, Computer Science & Engineering Department, Jahangirnagar University, Savar, Dhaka, Bangladesh.

Mrs. Smitha Ramachandran M.Sc(CS).,
SAP Analyst, Akzonobel, Slough, United Kingdom.

Dr. V. Vallimayil Ph.D.,
Director, Department of MCA, Vivekanandha Business School For Women, Elayampalayam, Tiruchengode - 637 205, India.

Mr. M. Moorthi M.C.A., M.Phil.,
Assistant Professor, Department of computer Applications, Kongu Arts and Science College, India

PremaSelvarajBsc,M.C.A,M.Phil
Assistant Professor,Department of Computer Science,KSR College of Arts and Science, Tiruchengode

Mr. G. Rajendran M.C.A., M.Phil., N.E.T., PGDBM., PGDBF.,
Assistant Professor, Department of Computer Science, Government Arts College, Salem, India.

Dr. Pradeep H Pendse B.E.,M.M.S.,Ph.d
Dean - IT,Welingkar Institute of Management Development and Research, Mumbai, India

Muhammad Javed
Centre for Next Generation Localisation, School of Computing, Dublin City University, Dublin 9, Ireland

Dr. G. GOBI
Assistant Professor-Department of Physics,Government Arts College,Salem - 636 007

Dr.S.Senthilkumar
Post Doctoral Research Fellow, (Mathematics and Computer Science & Applications),UniversitiSainsMalaysia,School of Mathematical Sciences, Pulau Pinang-11800,[PENANG],MALAYSIA.

Manoj Sharma
Associate Professor Deptt. of ECE, PrannathParnami Institute of Management & Technology, Hissar, Haryana, India

RAMKUMAR JAGANATHAN
Asst-Professor,Dept of Computer Science, V.L.B Janakiammal college of Arts & Science, Coimbatore,Tamilnadu, India

Dr. S. B. Warkad
Assoc. Professor, Priyadarshini College of Engineering, Nagpur, Maharashtra State, India

Dr. Saurabh Pal
Associate Professor, UNS Institute of Engg. & Tech., VBS Purvanchal University, Jaunpur, India

Manimala
Assistant Professor, Department of Applied Electronics and Instrumentation, St Joseph's College of Engineering & Technology, Choondacherry Post, Kottayam Dt. Kerala -686579

Dr. Qazi S. M. Zia-ul-Haque
Control Engineer Synchrotron-light for Experimental Sciences and Applications in the Middle East (SESAME),P. O. Box 7, Allan 19252, Jordan

Dr. A. Subramani, M.C.A.,M.Phil.,Ph.D.
Professor,Department of Computer Applications, K.S.R. College of Engineering, Tiruchengode - 637215

Dr. SeraphinChallyAbou
Professor, Mechanical & Industrial Engineering Depart. MEHS Program, 235 Voss-Kovach Hall, 1305 Ordean Court Duluth, Minnesota 55812-3042

Dr. K. Kousalya
Professor, Department of CSE,Kongu Engineering College,Perundurai-638 052

Dr. (Mrs.) R. Uma Rani
Asso.Prof., Department of Computer Science, Sri Sarada College For Women, Salem-16, Tamil Nadu, India.

MOHAMMAD YAZDANI-ASRAMI
Electrical and Computer Engineering Department, Babol"Noshirvani" University of Technology, Iran.

Dr. Kulasekharan, N, Ph.D
Technical Lead - CFD,GE Appliances and Lighting,
GE India,John F Welch Technology Center,Plot # 122, EPIP, Phase 2,Whitefield Road,Bangalore – 560066, India.

Dr. Manjeet Bansal
Dean (Post Graduate),Department of Civil Engineering,Punjab Technical University,GianiZail Singh Campus,Bathinda -151001 (Punjab),INDIA

Dr. Oliver Jukić
Vice Dean for education,Virovitica College,MatijeGupca 78,33000 Virovitica, Croatia

Dr. Lori A. Wolff, Ph.D., J.D.
Professor of Leadership and Counselor Education,The University of Mississippi,Department of Leadership and Counselor Education, 139 Guyton University, MS 38677

Contents

3. **GRAHAS VR STEP Approach: A User-Centric Framework for Developing Immersive Training Experiences ……. 1889**

4. **Corporate investigation Automation using AI, ML & LLM 1892**

INTERNATIONAL JOURNAL OF INNOVATIVE TECHNOLOGY AND CREATIVE ENGINEERING (ISSN:2045-8711)
VOL.15 NO.05 MAY 2025

GRAHAS VR STEP Approach: A User-Centric Framework for Developing Immersive Training Experiences

Srinivasan Yagnanarayanan [#1], Sriram Kesavan [#2]

[#] *Square Comp Solutions, Chennai, India*

[1] srinivasan@grahasvr.com

[2] sriram.k@grahasvr.com

Abstract— **This paper introduces the GRAHAS VR STEP Approach, a user-centric framework for developing and implementing Extended Reality (XR) training solutions in industrial and enterprise setting. The STEP Approach, encompassing Story, Emotion, and Place, leverages cognitive psychology principles to create immersive and engaging learning experiences. We discuss the framework's four-stage co-creation model (Dialogue, Discovery, Develop, and Deploy) and highlight its effectiveness in delivering customized XR training solutions that prioritize user needs and maximize learning outcomes.**

Keywords: Extended Reality (XR), Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR), Industrial Training, User-Centric Design, Co-creation, STEP Framework, GRAHAS VR

I. INTRODUCTION

Effective training is crucial for workforce development and organizational success. While XR technologies offer immense potential for revolutionizing training practices, a user-centric approach is essential to ensure that these solutions are tailored to specific needs and learning objectives. The GRAHAS VR STEP Approach provides a framework for developing and implementing customized XR training experiences that prioritize the user and foster active engagement.

II. ADDRESSING INDUSTRY CHALLENGES WITH THE GRAHAS VR STEP APPROACH

Today's industries face numerous challenges in workforce training, including high costs, time constraints, limited exposure to real-world scenarios, and safety concerns. Traditional training methods often fail to address these challenges effectively, leading to decreased efficiency, compromised safety, and a negative impact on ROI. Based on our research and study, we have found out that on an average it takes about 12-18 months for a New Hire to handle complex tasks and tools.

GRAHAS VR has developed the STEP Approach to overcome these challenges by offering a unique, user-centric framework that prioritizes customization, collaboration, and cognitive engagement. This approach ensures that XR training solutions are tailored to specific needs, learning styles, and organizational objectives, maximizing learning outcomes and delivering a positive impact on workforce performance and ROI.

Fig. 1. GRAHAs VR STEP FRAMEWORK

III. THE GRAHAS VR STEP APPROACH

The STEP Approach is built on three core principles:

- **Story:** Leveraging the power of narrative learning to create engaging and memorable training experiences.
- **Emotion:** Incorporating emotional engagement to enhance motivation, empathy, and knowledge retention.
- **Place:** Utilizing contextual learning by immersing trainees in realistic virtual environments that replicate their workspaces.

These principles are integrated into a four-stage co-creation model:

- Dialogue: Engaging in open communication with users to understand their training needs, challenges, and objectives.
- Discovery: Conducting thorough research and analysis to identify the most effective XR solutions for the specific context.

- Develop: Collaboratively designing and developing customized XR training modules that incorporate the STEP principles.
- Deploy: Implementing and evaluating the XR training solutions, ensuring seamless integration and ongoing support.

IV. Unique Aspects and Benefits of the STEP Approach

The STEP Approach offers several unique aspects that make it an effective and efficient solution for XR training development:

- User-Centric Design: The entire process revolves around the user, ensuring that their needs and preferences are prioritized at every stage.
- Co-creation Model: Clients are actively involved throughout the development process, fostering collaboration and ensuring alignment with their objectives.
- Agile Methodology: The STEP Approach follows an agile methodology, allowing for flexibility, iterative development, and rapid adaptation to changing requirements.
- Cognitive Engagement: By leveraging cognitive psychology principles, the STEP Approach creates immersive and emotionally engaging experiences that maximize learning outcomes.

These unique aspects translate into several benefits for clients:

- Enhanced User Engagement: Immersive narratives, emotional connections, and contextualized learning environments foster active participation and knowledge retention.
- Customized Solutions: The co-creation model ensures that XR training solutions are tailored to specific user needs and learning objectives.
- Improved Learning Outcomes: By leveraging cognitive psychology principles, the STEP Approach maximizes learning effectiveness and skill development.
- Increased ROI: Effective training programs lead to improved workforce performance, reduced errors, and increased productivity, ultimately driving a higher return on investment.

V. Typical ROI for Clients

GRAHAS VR has observed significant ROI for clients who have implemented XR training solutions using the STEP Approach. Typical outcomes include:

- Increased Efficiency: Reduction in training time by up to 40% and improvement in productivity by 4X.
- Cost Savings: Reduction in training costs by over 50%.
- Improved Safety: Reduction in workplace accidents and enhanced safety training effectiveness.
- Enhanced Engagement: Increased learner motivation, confidence, and focus.

VI. Case Studies

GRAHAS VR has successfully implemented the STEP Approach across various industries, including:

- Manufacturing: Developed VR simulations for training on complex assembly procedures and equipment operations, while increasing productivity by 40% and reducing costs by 50%.
- Life Sciences: Created AR application for training on Human Anatomy of Bone Sets for Medical Students, where access to cadavers is limited, and an AR-based solution provides increased accessibility and remote collaboration.
- IoT: Designed VR experiences for training on customer handling skills and product demonstration techniques, thereby resulting in increased sales and revenue.
- Pharma: Deployed AR & VR applications for demonstrating the machinery involved in the tablet manufacturing process and providing complete end-to-end training of operational procedures and processes, resulting in reduced errors and overall training time.
- Industrial: Developed CNC Machine Training to help trainees learn about conducting a job on a 5-Axis CNC Machine, increasing practical exposure with minimal/no physical interaction with the machine.

These implementations have demonstrated significant improvements in learning outcomes, training efficiency, and user satisfaction, while reducing overall costs.

VII. Conclusion

The GRAHAS VR STEP Approach provides a user-centric framework for developing and implementing effective XR training solutions. By leveraging cognitive psychology principles and a co-creation model, the STEP Approach ensures that XR training experiences are engaging, customized, and impactful. As XR technologies continue to evolve, the STEP Approach will remain a valuable guide for creating immersive learning experiences that empower individuals and organizations to thrive in the future of work.

Acknowledgment

We acknowledge the contributions of our team, clients, partners, and mentors in the development and refinement of the GRAHAS VR STEP Approach.

Publications

- Virtual Training for Real Life Scenarios, printed in the Times of India, Chennai Edition dated 27th January ‘2025.
- Metaverse Onboarding & Training by Srinivasan Yagnanarayanan in XTIC Chronicle, June ‘2024 – Newsletter of Experiential Technology Innovation Centre of IIT Madras, Chennai.
- Spatial Computing: A Catalyst for Tamil Nadu’s Trillion-Dollar Economy in the Age of Digital Transformation by Srinivasan in the Knowledge

Paper published by FICCI in their Digital Transformation Summit, July '2024.

- How India can Achieve Trillion Dollars in VR / AR by Srinivasan in the Knowledge Paper published by FICCI in their Digital Transformation Summit, July '2023.

REFERENCES

[1] *PWC 2020 Report of The Effectiveness of Virtual Reality Training.*
[2] *The Economic Times Report VR / AR / MR adoption for Smart Manufacturing '2022.*
[3] *Deloitte Case Study: Real Learning in a Virtual World - 2020.*

INTERNATIONAL JOURNAL OF INNOVATIVE TECHNOLOGY AND CREATIVE ENGINEERING (ISSN:2045-8711)
VOL.15 NO.05 MAY 2025

CORPORATE INVESTIGATION USING AI, ML & LLM

Babu Madhavan , Dr.N.Kala ,Premanand Narasimhan
Chennai, India
bob4u1985@gmail.com
kalabaskar@gmail.com
premvn@gmail.com

Abstract—

Investigation of Incidence/Fraud/Crime in Corporate or any organization in current scenario is challenging as the volume of data dictates what ought to be, even for defining a scope. The data tyranny such as database to data lake structured to unstructured decides what the investigation resources to be.

Introduction:

Corporate investigation Automation using AI, ML & LLM

Investigation of Incidence/Fraud/Crime in Corporate or any organization in current scenario is challenging as the volume of data dictates what ought to be, even for defining a scope. The data tyranny such as database to data lake structured to unstructured decides what the investigation resources to be.

The humongous data investigation with conventional human methods are infeasible with respect to human resource, Time and money.

As we know "Delayed Justice is denied justice" so how fast the investigation and justice systems work out to standout and prevail justice is important.

To speed up the investigation it needs to be automated with less or nil tolerance. Especially in corporate when data or information is considered to be wealth. The timely investigation provides better insights towards their proactive policy and to curb further financial loss due to such incidence/fraud/crime.

Some of the commercially available tools (e,g IDEA,ACL & Relativity) which can provide assistance to assessor, auditor and investigator in some extent but the holistic tool which can provide automation to different cases are need of an hour.

This project shall provide holistic and comprehensive tool for an investigation

Project Objective:

The main goal of Corporate investigation automation using AI,ML &LLM would certainly provide

- ***Fast and negligible or zero tolerant results***
- ***Less man power with highest pristine results***
- ***Comprehensive tool for reactive as well as provides insights for proactive decisions and policies***

And can,

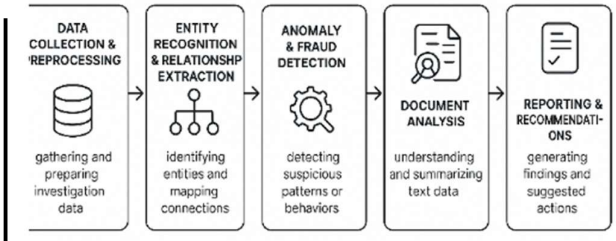
- ***Identify signature of incidents/frauds/Crimes(Data leakage, Data theft, Data sabotage, IP violation/theft, espionage, stalking, financial frauds) in an organization***
- ***Identify the Modus operandi and link analysis with respect to incidence/fraud/crime***
- ***Classify the risk associated with respect to incident/fraud/crime***
- ***Prioritize and label the risk or facts findings and to decide discretionary of final stake holders***
- ***Model to be created with respect to incidence/fraud/crime of all possible category or context***

Corporate investigation automation using AI,ML&LLM:

Automating corporate investigations with AI, Machine Learning (ML), and Large Language Models (LLMs) involves building a pipeline that handles:

1. ***Data Ingestion & Preprocessing***
2. ***Entity Detection & Relationship Mapping***
3. ***Anomaly Detection***
4. ***Natural Language Processing for Document Review***
5. ***Automated Reporting***

Here's a model stack to power this workflow:


DATA COLLECTION & REPROCESSING
gathering and preparing investigation data
ENTITY RECOGNITION & RELATIONSHP EXTRACTION
identifying entities and mapping connections
ANOMALY & FRAUD DETECTION
detecting suspicious patterns or behaviors
DOCUMENT ANALYSIS
understanding and summarizing text data
REPORTING & RECOMMENDATI-ONS
generating findings and suggested actions

1. Data Collection & Preprocessing

AI Tools:

- ***Apache NiFi / Airbyte – for ingesting data from email, CRM, financial systems.***
- ***spaCy / Hugging Face Transformers – for NLP tasks like tokenization, POS tagging.***

2. Entity Recognition & Relationship Extraction

LLMs & NLP Models:

- ***spaCy NER, Stanford CoreNLP, or OpenAI GPT-4 – extract names, locations, organizations, dates.***
- ***BERT for Relation Extraction or REBEL (Hugging Face) – uncover links like employee <-> transaction <-> vendor.***

Use case: Identify hidden relationships between employees and vendors in procurement fraud.

3. Anomaly & Fraud Detection

ML Models:

- *Unsupervised:*
- *Isolation Forest*
- *Autoencoders*
- *DBSCAN – for finding unusual behavior in financial or communication data.*

Supervised (if labeled data available):
XGBoost, Random Forest, LightGBM

Use case: Detect patterns like excessive spending, duplicate invoices, or irregular access logs.

4. Natural Language Understanding & Document Analysis

LLMs:

- *GPT-4 / Claude / LLaMA-2 – summarize emails, flag risky communication, extract obligations from contracts.*

- *Embedding models: OpenAI Embeddings, Sentence-BERT – for similarity comparison across communications.*

Use case: Quickly scan and summarize 1000s of emails in a whistleblower case or compliance breach.

5. Knowledge Graph Construction

Tools:

- *Neo4j, Graphistry, or Amazon Neptune – visualizes entities and their connections.*
- *LangChain / Haystack – combine search with LLM-based question answering on internal corpora.*

Use case: Visualize people, transactions, companies across countries to find shell operations or collusion.

6. Reporting & Recommendations

LLM Tools:

- *LangChain + LLM – generate forensic reports automatically.*

- *Chatbot Interfaces – investigators ask questions like "Show me transactions over Rs.1cr between Feb–Mar 2024 linked to Mr.X."*

Optional Enhancements

Multimodal AI – integrate text, images (like scanned invoices), and audio (call recordings).

Time-series forecasting – if the case involves predicting financial behavior.

References

[1] Ashok, G., Brian, C., Mithun, K., Shanu, S., Abhinaya, S., & Bryan, W. (2015). Using Watson for Enhancing Human-Computer Co-Creativity. AAAI Symposium: 22–29..

[2] Chatbot Magazine (2019). A Visual History of Chatbots. Retrieved March 9, 2019 from: https://chatbotsmagazine.com/a-visual-history-of-chatbots-8bf3b31dbfb2

[3] Bousquet, O.; von Luxburg, U.; Raetsch, G., eds. (2004). Advanced Lectures on Machine Learning. Springer. ISBN 978-3540231226.

SPIN Chennai

One of the world's oldest SPIN organizations (more than 25 years old) and is one of the only 130 exclusive SPINs in the world.

SPIN Chennai was incorporated in 1995 as a not-for-profit organization and is one of the exclusive & dynamic SPINs amongst the 100 SPINs in the world today. It is affiliated to USA based Carnegie Mellon University's Software Engineering Institute and has been helping the Indian industry navigate the world of Software processes, Management Models and Technology Landscape by leading from the front.

Chennai SPIN(CSPIN) has been the pioneer in promoting various high maturity quality and management practices, processes, frameworks and models including CMMI 2.0, ISO(various flavors), Six Sigma, Lean, TOC, BS7799, GDPR, Agile, Malcolm Baldridge, Balanced Score Card, Blue Ocean Strategy, 5S, 7QC Tools, TQM, ESG etc

Members of SPIN Chennai include Corporates, Academic Institutions, Not-for-Profit Institutions, Consultants, Management professionals, BFSI Professionals, HR/Marketing/Sales Professionals, CXO's, Board of Directors, MSME's, Startups, Manufacturing Industry Professionals et al. SPIN Chennai provides various engagement mechanisms for stakeholders including roles like Event Sponsor, Corporate Member, Individual member, Event Delegate, Trainer, Trainee, Academic Partner,Strategic Partner etc.

SPIN CHENNAI
A forum of Software Professionals for open exchange of Software Process improvement experiences and ideas.
Join the conversation on
Value Stream Management in Software Delivery using The Flow Framework®
15th June 2022, Wed,
4.30 PM - 6 PM IST
Carmen DeArdo
• Senior Director - VSM Research & Design, Principal Flow Advisor @ Tasktop
• Author of A Leader's Guide to Digital Transformation

Generative AI is no longer just a tech trend — it's shaping business strategy, operations, and innovation across every industry. That's why SPICON 2025, hosted by SPIN Chennai, couldn't be more timely. This full-day conference explores how GenAI is applied across business domains — from manufacturing and BFSI to healthcare and logistics.

🌟 What's compelling about this event:

- ✅ Practical case studies from real-world deployments
- ✅ Strategic insights from industry and academia
- ✅ Coverage of AI certification frameworks like ISO 42001
- ✅ Cross-industry networking with peers and experts

In today's fast-evolving AI landscape, understanding the governance, impact, and application of GenAI is critical, and SPICON 2025 brings it all together under one roof.

SPIN Chennai

SPICON 2025

SPINNING GEN AI

A Premier Conference on
Generative AI Applications in Business

Theme: "Gen AI and Business"